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Annals of Biological Research, 2011, 2 (2) :26-29
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ISSN 0976-1233
CODEN (USA): ABRNBW

Effect of potassium humate and deproteinised Juice (DPJ) on seed germination and seedling growth of wheat and jowar

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ABSTRACT

A laboratory experiment were undertaken to study effect of potassium humate and deproteinised Juice (DPJ) of Lucerne and Fenugreek on seed germination and seedling growth of wheat (*Triticum aestivum* L.) cv. Lokvan and jowar (*Sorghum vulgare* L.) cv. Local. Seeds of wheat and jowar were treated with potassium humate (1.0%), either alone or in combination with deproteinised leaf juice (DPJ) of Lucerne and Fenugreek and water served as control. Seeds were then sown on moist blotter papers and percent seed germination (%) and seedling growth (root length and shoot length) of wheat and jowar were recorded at the end of tenth day. Results obtained during this investigation clearly indicated that DPJ with potassium humate treated crop plants showed significant increase on seed germination and seedling growth of wheat and jowar than either potassium humate (1.0%), DPJ or control (untreated).

Key words: Potassium humate, Deproteinised leaf juice (DPJ), Seedling emergence.

INTRODUCTION

Humus is final residue obtained from microbial decomposition of organic mater [1]. Humic substances are component of humus and widely distributed over earth surface [2]. Humic substances classified into three categories like humic acid, fulvic acid and humin [3]. Seed germination and seedling growth is stimulated by humic substances [4, 5]. Potassium humate is the salt of humic acid. Humate contain many beneficial group such as the carboxylic (-CooH) and phenolic (oH) groups. Negatively charged particles of humates help in chelating with most the plant nutrients and water molecules. By improving the cation exchange capacity of the soil, humic acid increases the soil ability to hold more nutrients and moisture for the plant to utilize, which improve the efficiency of fertilizers. Poor seed germination and seedling establishment

adversely affect growth and development of crop plants and results into low yields of crop plants. The success of seedling growth depends on formation of radicle and plumule. Seedling growth in the form of root length and shoot length of crop plants are positively affected by humic acid application [6,7]. Development of roots regards to number, length, and mass was increased when grown in sand or nutrient solution to which were added humic or fulvic acids extracted from oxidized lignite [8,9]. The humic acid applied seedlings had at least 1.65 cm longer shoots than the non applied ones [10]. Humic acid increases seedling lengths in treated lettuce and tomato seeds in Petri dishes with humic acids derived from oxidized lignite [11]. Humic acid increased emergence, growth and nutrient contents of okra (*Abelmoschus esculentus* L cv. Sultani)[12]. Application of 1000 and 2000 mg kg humic acid 50 mg kg calcium nitrate significantly affected seedling pepper growth by increasing fresh and dry leaf weight, fresh and dry root weight, stem diameter and root length and shoot length [13]. By product of green crop fractionations is deproteinised juice (DPJ) [14]. DPJ consists of many free amino acids, vitamins and hormones and foliar application of deproteinised Juice significantly increased the growth and yield of crop plants [15]. In present paper an attempt is made to discuss the importance of potassium humate (1.0%), deproteinised leaf juice (DPJ) of Lucerne and Fenugreek, potassium humate (1.0%) in combination with deproteinised leaf juice (DPJ) of Lucerne and Fenugreek and water served as control on seed germination and seedling growth (root length and shoot length) of wheat and jowar .

MATERIALS AND METHODS

Seeds of wheat (*Triticum aestivum* L.) cv. Lokvan and jowar (*Sorghum vulgare* L.) cv. Local were collected from field during year 2007 and stored in gunny bags until used. Potassium humate was obtained from M/S. V.Kumar and Sons, Aurangabad (M.S) and the solutions was prepared by dissolving 1.0 g of potassium humate in 100 ml water.

For the preparation of Deproteinised leaf juice (DPJ), Fresh, green and healthy leaves of lucerne (*Medicago sativa* L.) and fenugreek (*Trigonella Foenum-graecum* L.) were crushed to a fine pulp. The pulp was pressed and the leaf juice released was collected separately and heated at 95°C. It was then filtered and filtrate (Deproteinised juice) was collected.

Effect of potassium humate, DPJ (Lucerne and fenugreek) and DPJ with potassium humate were tested on seeds of wheat and jowar on moistened blotters in Petri dishes by following ISTA procedure [16]. In each separately Petri dish 10 seeds were sown and regularly irrigated with potassium humate, DPJ (Lucerne and fenugreek) and DPJ with potassium humate. Final value was taken as mean (average) of three replicates for treatment and control. Seed germinated in tap water was served as control for comparison.

The percent seed germination and seedling growth (root length and shoot length) of wheat and jowar was recorded 10 days after sowing.

RESULTS AND DISCUSSION

From results presented in table-1 show that there was an increase in seed germination in seeds treated with potassium humate (1.0%), DPJ and DPJ with potassium humate over control in

wheat. Potassium humate and DPJ with potassium humate showed 100% seed germination but DPJ alone showed 93.33% in Lucerne and 93.33% in fenugreek against 86.33% in water (control). As regards to the seedling growth i.e. root length and shoot length, it was found that there was increase in root and shoot lengths in the seedlings treated with potassium humate, DPJ and DPJ with potassium humate over control (water). Root length was more in seedlings treated with potassium humate than the DPJ alone but combined effect of DPJ with potassium humate gave more root length than all the treatments. Similar trend was noted as regards to the shoot length.

Results presented in Table-2 show that there was an increase in seed germination in seeds treated with potassium humate (1.0%), DPJ and DPJ with potassium humate over control in jowar. Potassium humate and DPJ with potassium humate showed 100% seed germination but DPJ alone showed 90.00% in Lucerne and 90.33% in fenugreek against 90.00% in water (control). As regards to the seedling growth i.e. root length and shoot length, it was found that there was increase in root and shoot lengths in the seedlings treated with potassium humate, DPJ and DPJ with potassium humate over control (water). Root length was more in seedlings treated with potassium humate than the DPJ alone but combined effect of DPJ with potassium humate gave more root length than all the treatments. Similar trend was noted as regards to the shoot length.

Table-1 Effect of potassium humate (1.0%) and Deproteinised Juice (DPJ) on seed germination and seedling growth of *Triticum aestivum* (L.) cv. Lokvan. (After 10 days)

| Sr. No | Treatments | | Seed germination (%) | Root length (cm) | Shoot length (cm) |
|--------|-------------------------|---|----------------------|------------------|-------------------|
| 1 | Potassium humate (1.0%) | | 100 | 14.41 | 16.42 |
| 2 | Lucerne | Deproteinised Juice | 93.33 | 13.21 | 11.12 |
| | | Deproteinised Juice with potassium humate(1.0%) | 100 | 17.12 | 18.42 |
| 3 | fenugreek | Deproteinised Juice | 93.33 | 11.67 | 9.50 |
| | | Deproteinised Juice with potassium humate(1.0%) | 100 | 16.10 | 15.27 |
| 4 | Control (Water) | | 86.33 | 9.80 | 8.98 |

Table-2 Effect of potassium humate (1.0%) and Deproteinised Juice (DPJ) on seed germination and seedling growth of *Sorghum vulgare* (L.) cv. Local. (After 10 days)

| Sr. No | Treatments | | Seed germination (%) | Root length (cm) | Shoot length (cm) |
|--------|-------------------------|--|----------------------|------------------|-------------------|
| 1 | Potassium humate (1.0%) | | 100 | 19.8 | 13.4 |
| 2 | Lucerne | Deproteinised Juice | 90.00 | 15.9 | 11.8 |
| | | Deproteinised Juice with potassium humate (1.0%) | 100 | 22.3 | 14.8 |
| 3 | fenugreek | Deproteinised Juice | 90.33 | 13.9 | 10.2 |
| | | Deproteinised Juice with potassium humate (1.0%) | 100 | 21.2 | 11.3 |
| 4 | Control (Water) | | 90.00 | 10.2 | 8.9 |

CONCLUSION

The studies confirmed the treatment of potassium humate, DPJ with potassium humate is stimulatory for getting maximum seed germination and better seedling growth of wheat and jowar.

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